Received: 11 October 2018 | Accepted: 9 January 2019

DOI: 10.1002/aid2.13160

CASE REPORT

Advances in Digestive Medicine WILEY

Esophageal perforation caused by a central venous catheter: A case report and literature review

Wei-Ming Chen[1,2,3] | **Ming-Shih Chiang**[1] | **Po-Chang Wang**[4] | **Kuo-Liang Wei**[1,3] | **Shui-Yi Tung**[1,3] | **Te-Sheng Chang**[1,3] | **Chao-Hung Hung**[1,3,5]

[1]Division of Gastroenterology and Hepatology, Department of Internal Medicine, Chiayi Chang Gung Memorial Hospital, Chiayi, Taiwan

[2]Department of Health and Nutrition, Chia Nan University of Pharmacy and Science, Tainan, Taiwan

[3]College of Medicine, Chang Gung University, Taoyuan, Taiwan

[4]Division of Cardiology, Department of Internal Medicine, Chiayi Chang Gung Memorial Hospital, Chiayi, Taiwan

[5]Division of Hepatogastroenterology, Department of Internal Medicine, Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan

Correspondence
Chao-Hung Hung, Division of Gastroenterology and Hepatology, Department of Internal Medicine, Chiayi Chang Gung Memorial Hospital, Number 6, Section West, Jiapu Road, Puzi City, Chiayi County 61363, Taiwan.
Email: chh4366@yahoo.com.tw

Abstract

Malposition of the central venous catheter is rare but may cause morbidity and mortality. Here, we presented a male patient who suffered from a misplaced central venous catheter into the esophagus and caused perforation. We removed the misplaced central venous catheter directly after evaluated by computed tomography. We provided an available method to evaluate and solve this problem after literature view. In catheter-related esophageal perforation patient, conservative treatment is an optional therapy after removed the misplaced catheter without fluoroscopy guided according to clinical presentation.

KEYWORDS

endoscopic hemostasis, endoscopic imaging, endoscopy

1 | INTRODUCTION

A central venous catheter insertion via the subclavian, the internal jugular or femoral vein is associated with infectious, thrombotic, and mechanical complications.[1] Malposition of the central venous catheter occurred in about 5% of the patients with complications and caused malfunction, even mortality.[2,3] The most discussed extracava malposition included mediastinum, pleura and pericardium misplacement.[4] Here, we presented a rare case of a misplaced catheter into the esophagus via an internal jugular vein approach.

2 | CASE REPORT

An 82-year-old male, who was sent to our emergent department because of consciousness changed for 2 hours. The coma scale became E1V1M1 from E4V5M6. His body temperature was 34°C, pulse rate was 34 beats/min, respiratory rate was 12 times/min, and his blood pressure was too low to measure when he arrived at the emergent department. For his critical condition, emergent intubation, cardiopulmonary resuscitation, fluid challenge via the peripheral vein, and central venous catheter placement via the left internal jugular vein with the Seldinger

technique were performed. The position of the central venous catheter was checked by chest X-ray (Figure 1 black arrow). The 12-lead electrocardiogram showed sinus bradycardia and ST elevation at leads V2-V3. For suspect ST elevated myocardial infarction related cardiogenic shock, primary percutaneous coronary intervention was performed but revealed a patent coronary artery. His urinary analysis showed pyuria. The abdominal computed tomography showed negative results for intra-abdominal bleeding or infection. Then, this patient was treated for a urinary tract infection related septic shock in the cardiac intensive care unit (CICU). After four days treatment, his sepsis was improving and started weaning from the ventilator. However, on day 5 in the CICU, coffee ground materials from the nasogastric tube (NG) and tarry stool were found. The hemoglobin decreased from 11.7 g/dL to 7.5 g/dL. For his anemia, a packed red blood cell (PRBC) transfusion of 500 ml was given. On day 6, the coffee grounds from the NG tube was decreasing but the tarry stool progressed. On day 7, the hemoglobin was 7.7 g/dL. A PRBC transfusion was given again but a tarry stool happened just after transfusion. For this, an esophagogastrodeudenoscopy (EGD) was done and revealed a central venous catheter penetrated into the esophagus (Figure 2). EGD was held because of esophageal perforation. After discussing with the cardiovascular surgeon, we removed the catheter directly and pressed the puncture site for 5 minutes. There was no subcutaneous emphysema or hematoma after removing the catheter. Conservative treatment with NPO, antibiotics with Ceftriaxone plus clindamycin and an intravenous proton pump inhibitor were given. Three days later, the computed tomography of the neck and chest revealed a negative of subcutaneous

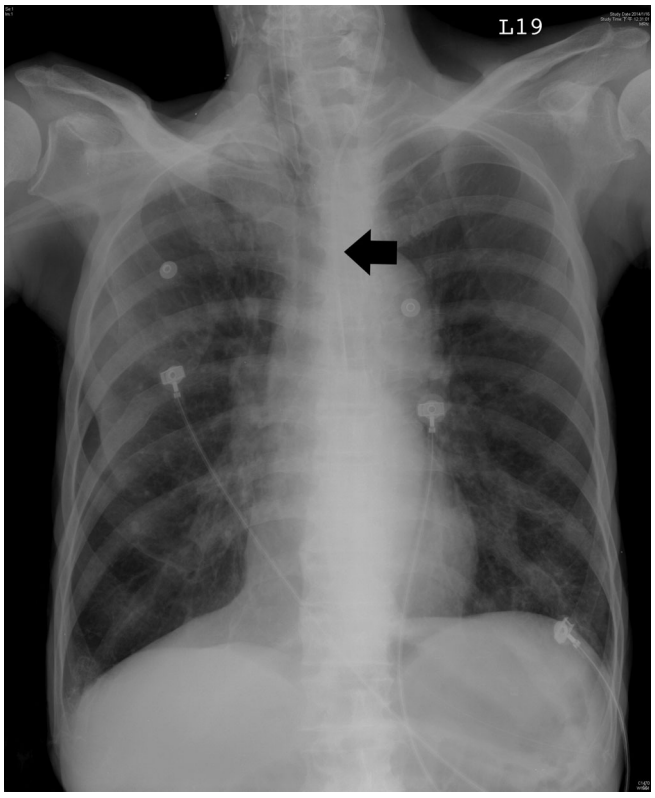

FIGURE 1 Chest X-ray after central venous catheter placement. The tip of the catheter is at the carina of trachea rather than right antrum but miss-diagnosed initially (black arrow)

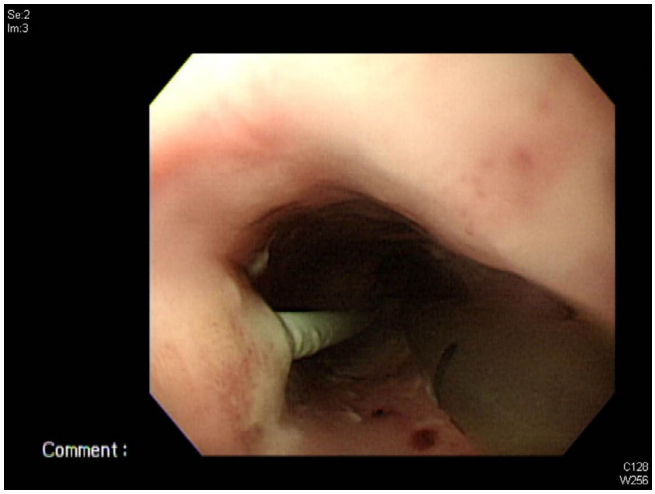

FIGURE 2 Esophagogastroduodenoscopy view. A central venous catheter penetrated into the esophagus (left side). The nasogastric tube was in placed (right side)

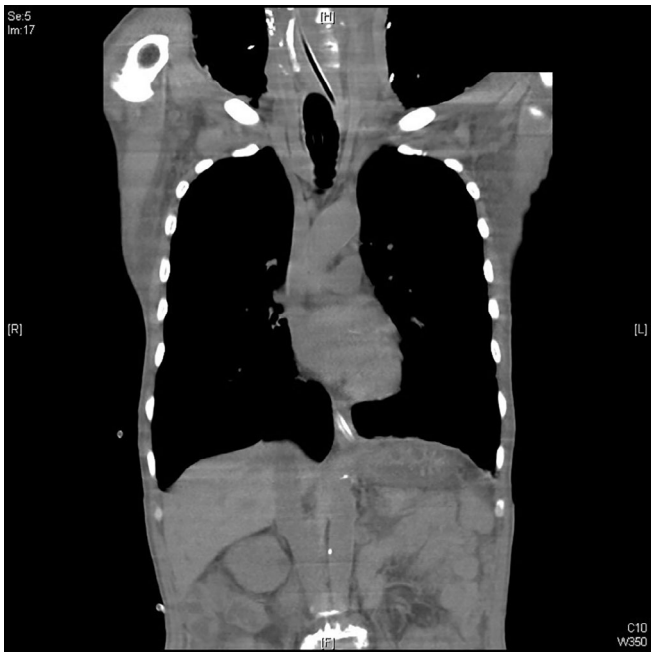

FIGURE 3 Computed tomography of the neck and chest after removing the central venous catheter. There was no local subcutaneous emphysema, pneumomediastinum, or mediastinitis

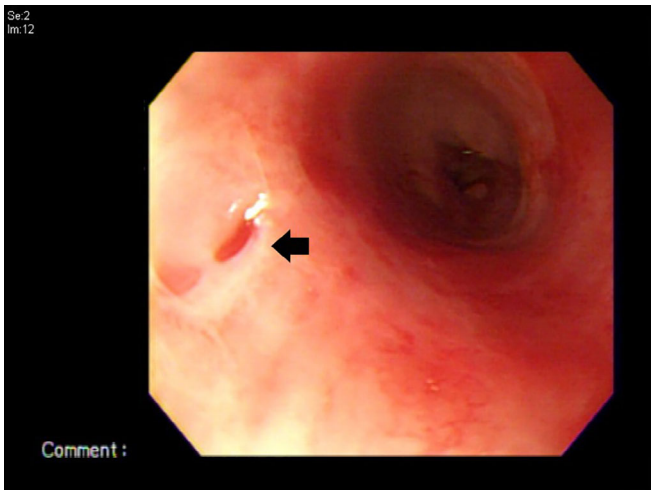

FIGURE 4 Esophagogastroduodenoscopy view. A healed esophageal perforation (black arrow) after removed the misplacement central venous catheter two weeks later

emphysema or pneumomediastinum (Figure 3). On day 14, a massive tarry and bloody stool occurred. The EGD was performed and revealed healed esophageal perforation (Figure 4 black arrow) and active ulcer bleeding at the duodenal bulb. Unfortunately, endoscopic hemostasis was failed by diluted vasopressor local injection and argon plasma coagulation. Angiography showed an active bleeder from inferior pancreaticoduodenal branches. However, the family refused embolization and surgical intervention to stop the bleeding. This patient expired on day 15 in CICU because of upper gastrointestinal bleeding.

3 | DISCUSSION

A misplaced central venous catheter (CVC) can be divided into intra-cava and extra-cava.[2] The extra-cava malposition has been reported in the mediastinum, the pleura, the pericardium, the trachea, the subarachnoid space, and other aberrant sites[4] but less discussed in the esophagus. There were many methods to prevent the malposition of the CVC, which included the following. Choosing the right side approach over the left side,[1] ultrasonography guided insertion,[5] choosing a proper length guide wire,[6] confirming adequate access by flush test,[7] confirming the tip at the junction of the superior vena cava (SVC) and right atrium by X-ray.[8] In this case, we choose a right internal jugular vein approach initially but failed after several attempts. Unfortunately, a complication happened via left internal jugular vein approach. The chest X-ray of this case showed that the tip position was near the carina of the trachea but not the right antrum. If we confirmed the inadequate position of the CVC correctly, we might discover this complication earlier.

The management of the malposition of the CVC in extra-cava cases was individualized and often needed surgical interventions.[4] If the CVC perforates the right atrium or lower SVC, it might cause pericardial effusion and even cardiac tamponade.[9] In such a condition, urgent pericardiocentesis, pigtail insertion or surgical repair may be required. If the CVC tip damages the right border of the SVC, azygos, hemiazygos, and internal thoracic veins penetrate into the pleural space. It might cause pleural effusion or hemothorax initially or after fluid infusion. To prevent bleeding risk, the catheter might be removed under fluronoscopy and receive embolization if needed.[2,4] Excessive force to advance the catheter, guidewire, or dilator may cause the CVC to perforate the vessel wall into the mediastinum, and cause mediastinal hematoma or infection.[4] In severe cases, microcoil embolization or emergent median sternotomy may be needed.[10] In this patient, we removed the misplaced catheter directly without radiologic assistance because there was no obvious subcutaneous hematoma or bleeding from the inserted site to suspect possible arterial puncture.

Iatrogenic esophageal perforation is the main etiology of esophageal perforation, occupying up to 60%.[11] The etiology included routine endoscopic examination,[12] therapeutic endoscopy,[13] nasogastric tube insertion,[14] or even a migrated hemodialysis catheter from the jugular vein.[15] Surgical repair, resection, or bypass of the perforated esophagus is the main treatment for patients who suffer from mediastinitis or severe sepsis.[16] Other therapeutic options included esophageal stent placement[17] or conservative treatment[18] according to the patient's clinical condition. Prognosis is associated with early diagnosis, best supportive care, nutritional support, sepsis control, and re-establishment of esophageal continuity.[19] In this case, there were no obvious symptoms and signs of mediastinitis from the clinical condition or computed tomography. So, we gave a conservative treatment rather than through surgical intervention.

Iatrogenic esophageal perforation is a rare complication of the central venous catheter insertion. Conservative treatment is an optional therapy after removed the misplaced catheter without fluoroscopy guided according to clinical presentation in catheter misplacement related esophageal perforation cases. In this patient, he died because of gastrointestinal bleeding, unfortunately, so, the best treatment for such a complicated case needed more consideration.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ORCID

Wei-Ming Chen https://orcid.org/0000-0002-4949-393X

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How to cite this article: Chen W-M, Chiang M-S, Wang P-C, et al. Esophageal perforation caused by a central venous catheter: A case report and literature review. *Adv Dig Med*. 2020;7:93–96. https://doi.org/10.1002/aid2.13160